Exponents and Roots

Problem Solving: Scientific Notation

Write the correct answer.

1. In June 2001, the Intel Corporation announced that they could produce a silicon transistor that could switch on and off 1.5 trillion times a second. Express the speed of the transistor in scientific notation.

3. The elements in this fast transistor are 20 nanometers long. A nanometer is one-billionth of a meter. Express the length of an element in the transistor in meters using scientific notation.

2. With this transistor, computers will be able to do 1 × 109 calculations in the time it takes to blink your eye. Express the number of calculations using standard notation.

4. The length of the elements in the transistor can also be compared to the width of a human hair. The length of an element is 2 × 10−3 times smaller than the width of a human hair. Express 2 × 10−3 in standard notation.

Use the table to answer Exercises 5–9.  
Choose the best answer.

5. Express a light-year in miles using scientific notation.

A 58.8 × 1011 C 588 × 1010

B 5.88 × 1012 D 5.88 × 10−13

6. How many miles is it from Earth to the star Sirius?

F 4.705 × 1012 H 7.35 × 1012

G 4.704 × 1013 J 7.35 × 1011

7. How many miles is it from Earth to the star Canopus?

A 3.822 × 1015 C 3.822 × 1014

B 1.230 × 1015 D 1.230 × 1014

8. How many miles is it from Earth to the star Alpha Centauri?

F 2.352 × 1013 H 2.352 × 1014

G 5.92 × 1013 J 5.92 × 1014

|  |  |  |
| --- | --- | --- |
| Distance From Earth To Stars Light-Year = 5,880,000,000,000 mi. | | |
| Star | Constellation | Distance (light-years) |
| Sirius | Canis Major | 8 |
| Canopus | Carina | 650 |
| Alpha Centauri | Centaurus | 4 |
| Vega | Lyra | 23 |

9. How many miles is it from Earth to the star Vega?

A 6.11 × 1013 C 6.11 × 1014

B1.3524 × 1013 D 1.3524 × 1014

Challenge

|  |  |
| --- | --- |
| Scientific Notation | AU |
| 5.79 × 107 | 0.4 |
| 1.082 × 108 | 0.7 |
| 1.496 × 108 | 1.0 |
| 2.279 × 108 | 1.5 |
| 7.784 × 108 | 5.2 |
| 1.4294 × 109 | 9.6 |
| 2.875 × 109 | 19.2 |
| 4.5043 × 109 | 30.1 |

3. about 9.6 times

4. Neptune’s distance from the Sun is about 77.8 times that of Mercury.

Problem Solving

1. 1.5 × 1012 2. 1,000,000,000

3. 2 × 10−8 m 4. 0.002

5. B 6. G

7. A 8. F

9. D

Reading Strategies

1. 5 places 2. to the right

3. negative 4. 7.8 × 10−5

5. 8 places 6. to the left

7. positive

Puzzles, Twisters & Teasers

I. 5 E. 7

N. −4 A. −6

C. 8 H. −7

N. −4 M. 6

L. −2 B. 3

U. 2 X. 9

I N A H A M B U L A N C E

Answers for Lesson 4

Practice A

1. 7.95 × 109

2. 2.3668 ×106

3. 6.249 × 104

4.3.99 ×10−6

5.1.22 ×103

6. 1.8 ×104

7. 1.86 times

8. 5.91 ×1024

9. 1.0 ×107

Sources for question 7) [www.bloomingtonmn.org](http://www.bloomingtonmn.org)

Sources for questions 8 and 9) [www.ask.com](http://www.ask.com)

Practice B

**1.** 6.634 × 105 sq mi

**2.** 6.220 ×100 times

**3.** $5.368 × 109

**4.** 6.6 ×108 times

**5.** 2.7075 ×108 cu yd

Practice C

**1.** 1.56 × 105 sq mi **2.** 3.66 × 107

**3.** 2.45 × 103 km **4.** 5.6 ×100

**5.** 9.2 × 1010 pounds **6.** 8.3 minutes

Sources for questions 1, 2, and 4: [www.infoplease.com](http://www.infoplease.com)

Source for question 3: <http://solarsystem.nasa.gov.planets>

Sources for question 5: <http://nppga.org/consumers/funfacts>

and <http://ezinearticles.com>

Source for question 6: [www.universetoday.com](http://www.universetoday.com)

Review for Mastery

1. (1.8 × 1014) ÷ (4.6 × 109)

(1.8 ÷ 4.6) × (1014 ÷ 109)

0.391 × (1014 ÷ 109)

0.391 × 105

3.91 × 104